

Name: _____

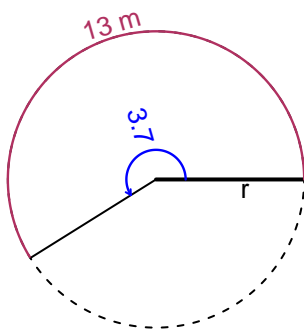
Date: _____

Trig Final (SLTN v600)

- You should have a calculator (like [Desmos](#)) and a [unit-circle](#) reference sheet.

Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The arc length is 13 meters. The angle measure is 3.7 radians. How long is the radius in meters?

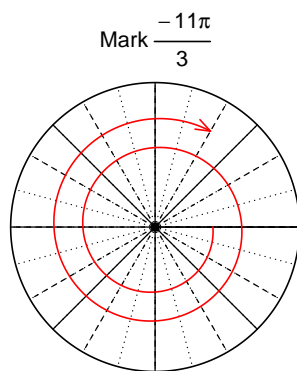


$$\theta = \frac{L}{r} \quad r = \frac{L}{\theta} \quad L = r\theta$$

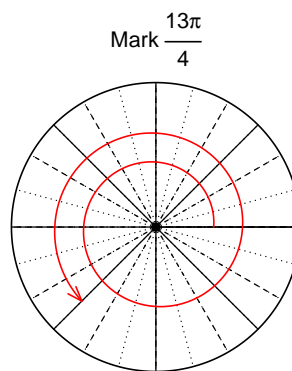
$$r = 3.514 \text{ meters.}$$

Question 2

Consider angles $-\frac{11\pi}{3}$ and $\frac{13\pi}{4}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\cos\left(-\frac{11\pi}{3}\right)$ and $\sin\left(\frac{13\pi}{4}\right)$ by using a unit circle (provided separately).

Find $\cos(-11\pi/3)$

$$\cos(-11\pi/3) = \frac{1}{2}$$

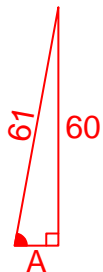
Find $\sin(13\pi/4)$

$$\sin(13\pi/4) = \frac{-\sqrt{2}}{2}$$

Question 3

If $\sin(\theta) = \frac{-60}{61}$, and θ is in quadrant IV, determine an exact value for $\cos(\theta)$.

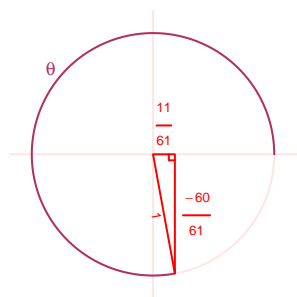
Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.



Solve the Pythagorean Equation

$$\begin{aligned}A^2 + 60^2 &= 61^2 \\A &= \sqrt{61^2 - 60^2} \\A &= 11\end{aligned}$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant IV in a unit circle.



$$\cos(\theta) = \frac{11}{61}$$

Question 4

A mass-spring system oscillates vertically with a midline at $y = -7.03$ meters, a frequency of 5.61 Hz, and an amplitude of 8.82 meters. At $t = 0$, the mass is at the minimum height. Write an equation to model the height (y in meters) as a function of time (t in seconds).

Any of these equations would get full credit.

$$y = -8.82 \cos(2\pi 5.61t) - 7.03$$

or

$$y = -8.82 \cos(11.22\pi t) - 7.03$$

or

$$y = -8.82 \cos(35.25t) - 7.03$$